



CONTROLLED ENVIRONMENT AGRICULTURE (CEA)

Policy brief for policymakers



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BACKGROUND

Environmental problem targeted

The environmental problem targeted by LIFE FARMITANK is excessive resources use in horticulture sector. The sector significantly contributes to the EU economy and food security, but with a growing population to feed, it faces several environmental problems:

Cultivable area

By 2050 the world population will increase by 2 billion, **and food supply should increase a ~ 70%** but around 80% of the earth's surface is already occupied.



Food waste

In the EU, **1/3 of produced food is lost** from producer to consumer and 45% of food waste corresponds to fresh fruit and vegetables.



Water scarcity

Considering that **36% of freshwater is used for horticulture**, it is vital to find ways to reduce this share.



Transport GHG emissions

Transport is responsible for 25% of EU greenhouse gas emissions and contributes to pollution. Society is becoming increasingly aware of the impact that food mileage has on the environment.



Use of pesticides and herbicides

Around **5.2 M tonnes of pesticide and herbicides** are used in the EU for food production, which acidifies soils and decreases crops' lifetime.



Having to increase food production but being restricted by available space and resources, **it is thus crucial to develop solutions to increase resource efficiency within the food value chain.**

To tackle some of the mentioned environmental problems, vertical farming emerged as an alternative horticultural system. Considering the above, year round production of large quantities of nutritious food from vertical farming within a limited space appears to be a revolutionary approach. Vertical farming has potential to sustain ever increasing world population especially in the urban areas with nutritional supplement thus providing food security.

However, current standard vertical farming systems have encountered key entry barriers (e.g., location, costs and logistics), which have prevented it from conquering the EU horticultural market and efficiently tackling the mentioned environmental problems.




LIFE FARMITANK TECHNOLOGY

Results and impacts

Vertical farming is a revolutionary and sustainable alternative to traditional agriculture and refers to the growing of crops mostly vegetables, ornamentals, and herbs on stacks of indoor shelves using artificial light, controlled environment and nutrient solutions, without sunshine and soil. Further they give fresh quality produce without depending on favourable climate, healthy soil, high water consumption and above all saves on labour, a scarce commodity today. Although the AgTech technologies are new and still developing, it is a promising solution to many issues that plague the sector.

The LIFE FARMITANK project has allowed to implement a disruptive vertical farming business model and demonstrate the environmental and socio-economic advantages of FARMITANK technology, in comparison with other commercial vertical farms solutions.

The main objective of this technology is to complement conventional agriculture methods for growing horticultural products anywhere with many environmental and productive advantages. The main environmental advantages are:

-  **Savings in water consumption**
-  **Pesticide and herbicide free**
-  **Local production**
-  **Minimal footage area required**
-  **Reduction in food transportation**
-  **Carbon footprint reduction**

In comparison with other vertical farms, the LIFE FARMITANK project has demonstrated the advantages and impacts below:

Reduction in resource utilization

- Crop yield enhancement: Doubling the yield obtained in lettuce thanks to double transplant and obtaining a 10% yield improvement on average for the different crop varieties.
- Mitigation of energy consumption and lowering the carbon footprint: Lowering a 16.9% the energy consumption and consequently lowering the carbon footprint by 13.4 tons of CO2 equivalent.
- Increase land use efficiency: LIFE FARMITANK is 170% more efficient than container vertical farms in terms of land use efficiency.

Support SMEs transformation

- Optimizing investment costs and corresponding risks: Lowering the investment costs by 6,66% and reducing risks thanks to modularity and scalability.
- Reducing labour costs: By 6% mainly due to the integration of the central elevator.

Social dimension: By creating a job position for vulnerable social groups people.



POLICY IMPLICATIONS

Resource efficiency in agriculture is part of the Roadmap to Resource Efficient Europe, which will stimulate the EU transition towards a circular economy and a sustainable food value chain. The project is aligned with the Green Deal Farm to Fork policy, by fostering sustainability in the EU food value and empowering SME horticulture entities and food retailers to contribute to this initiative. In addition, the project contributes to the following EU policies:

Contribution to EU environmental policies:

- **Contribution to Soil Thematic Strategy:** In order to protect European soils and ensure their sustainable use, LIFE FARMITANK contributed to this strategy by avoiding the use of pesticides and herbicides.
- **Policies in Water Scarcity & Droughts in the European Union:** One of the main blocks of this policies is water savings in agriculture. LIFE FARMITANK contributes to these policies by achieving a reduction in freshwater use of between 90 to 95% compared to standard agricultural practices.
- **EU Transport policy:** Standard cultivation in greenhouses and fields is usually carried out far from urban areas, where most of the population is located. Thanks to LIFE FARMITANK, food transport time is reduced as well as its associated cost and pollution, since this technology allows crop growing in urban areas (local production). Therefore, LIFE FARMITANK addresses congestion and air quality major challenges identified by the EU Transport policy by respectively reducing food transport length and time and by reducing food transport CO2 emissions.

Contribution to non-environmental EU policies:

- **Common Food Policy for the EU:** This policy sets a direction of travel for the whole food system, bringing together various sectoral policies that affect food production, processing, distribution, and consumption, and refocusing all actions on the transition to sustainability. LIFE FARMITANK addresses this challenge by providing a sustainable technology that involves and affect food production, processing, distribution, and consumption (end-user).
- **EU common agricultural policy:**
 - **Safeguard European Union farmers to make a reasonable living:** LIFE FARMITANK provides an increase in crop quality and quantity, which in turn will be translated into improved living and a boost of horticultural SME competitiveness in EU.
 - **Help tackle climate change and the sustainable management of natural resources:** The already mentioned environmental benefits that LIFE FARMITANK provides assess this aim.
 - **Maintain rural areas and landscapes across the EU:** LIFE FARMITANK reduces by 96% the required arable surface for horticultural farming to obtain the same production that the obtained using standard agricultural practices in open field.
 - **Keep the rural economy alive by promoting jobs in farming, agri-foods industries, and associated sectors:** LIFE FARMITANK has the potential of creating new job opportunities in locations where horticulture is not extensive (e.g., North Europe).
- **European Industrial Initiative on electricity grids:** One of the main objectives of this initiative is a completely decarbonised electricity production by 2050. FARMITANK technology contributes to assessing this objective by offering the possibility of integrating solar panels in its technology, thus allowing to reduce the corresponding standard grid electricity expenditure.
- **EU SME regional policies:** SMEs constitute 99% of food entities in the EU. Therefore, FARMITANK contributes to EU SME regional policies since it will boost SMEs competitiveness level thanks to the improved horticulture growing efficiency the technology provides and it will also help create a business-friendly environment thanks to improvements in working safety and ergonomics.

ANTICIPATORY POLICY-MAKING

Urban agriculture, including vertical farming, has the potential to contribute to viable food production, sustainable management of natural resources, climate action, and balanced territorial development. In March 2020, the European Commission adopted a new circular economy action plan with food, water and nutrients representing one of the key value chains, and, in May 2020, the farm to fork strategy at the heart of the European Green Deal. Vertical farming could contribute to these objectives by reducing the use of agri-chemicals and water in agriculture, and by countering soil degradation, deforestation and water eutrophication (increased nutrient load).

While the EU has been funding initiatives with a vertical farming-related theme under research programmes, the European Regional Development Fund (ERDF) and the European Agricultural Fund for Rural Development (EAFRD), it is not covered by EU agricultural and climate policies. This could partially be attributed to the nature of vertical farming as a policy theme, as it is found at the intersection of rural and urban planning, and research and development (R&D) and agricultural policies. To make vertical farming a successful contributor to the food supply, it will have to be recognised in public policy.

HOW CAN POLICIES HELP TO BOOST VERTICAL FARMING?

R&D efforts are focusing on reducing operational costs and the high energy demand, as well as addressing challenges related to economic profitability and consumer acceptance. However, for the success of technology, it is also necessary the public approval and the correct legislation from government bodies. Here are a few ways government policy could help boost the presence of vertical farming in the EU:

Visibility

Boosting the visibility of CEA will help the transition from novel technology to an established part of our food systems. It will also encourage farmers to try CEA by softening the risk of adopting a brand new technology. Increasing the visibility of vertical farms could come in many different forms. Government funded projects and endorsements can help create and boost these types of opportunities.

Collaborations

Dedicated strategies to encourage academic, industrial and community collaborations would help to explore the environmental and commercial benefits of growing different crops in these settings. Funding bodies have been invaluable in their support of developing agritech solutions. Research programmes allow growers to explore where controlled environment agriculture is best and commercially suitable, and for which crops.

Financial

The role of policy makers is to maximize the value returned to the public, and in recent years a lot of work has been invested to recognise the principle of “public money for public goods” within environmental grant giving and support services.

Since many controlled environmental agricultural systems now have measurable environmental impact, they should be seen as environmentally friendly machinery: existing grants and funding that encourage farmers to buy environmentally friendly machinery or tech should also include technology such as indoor or container farms. These incentives could also come in the form of tax relief or subsidies for food production methods that reduce carbon, or projects that serve deprived areas.

Standards

We are currently lacking legislation and standards for vertically farmed produce. The industry needs set quality standards, data standards and training standards in order to mature. Currently, vertically farmed produce cannot be marked as organic as it can be in the USA so a special certification system may be needed.

Training & jobs

We need to recognise the role of indoor farmers in the future of food production. And this is not to say that an indoor farmer needs to be a role separate from existing agricultural jobs - but there should be opportunity for education and upskilling of farmers, as well as offering training programmes for young people. Accessibility into agriculture can be difficult for those not from a farming background or for those living in urban areas - vertical farming can help to improve this by creating farming environments within and around cities.

As well coordinating better training for growers, it is also important to make sure that there are secure and available job opportunities to find work that will be stable and pay fair prices

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